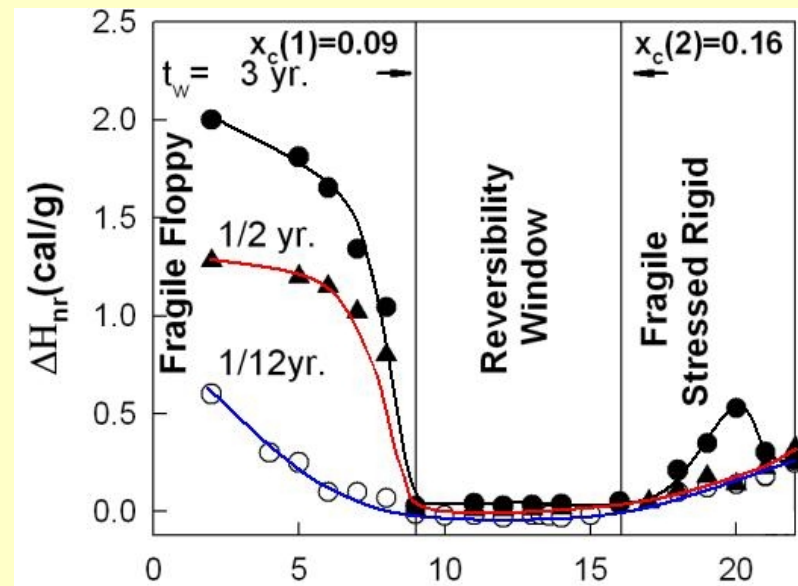


Self-Organization in Network Glasses

Punit Boolchand, University of Cincinnati, **DMR-0101808**

Optical fibers, DVDs and computer memories represent some of the large scale applications of network glasses. *Aging* is generally viewed to be ubiquitous in glasses and a hindrance to applications. Here we find that glasses in select range of chemical compositions not only possess glass transitions that are almost **completely thermally reversing** but also **do not age**. The figure shows a plot of the *non-reversing enthalpy* near T_g , ΔH_{nr} in ternary $As_xGe_xSe_{1-x}$ glasses as a function of x measured 1/12 yr, 1/2 yr and 3 yrs after synthesis. One finds the enthalpy to *vanish* in the $0.09 < x < 0.16$ range, the **reversibility window**. Note that for glasses in the *window*, the enthalpy does age in sharp contrast to glass compositions outside this *window* where the term ages. Numerical simulations reveal that glasses in the *window* possess backbones that are structurally **stress-free** and these glasses are viewed to be **self-organized**.



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Education:

- In the past year, three graduate students (Fei Wang, Liuchun Cai and S. Chakravarty) have defended their Masters Thesis. Fei is continuing on towards Ph.D work. Daniel G. Georgiev defended his Ph.D. Thesis and joined Wayne State University as a Research Associate in spring .Three new students have joined research activities of the group and include Ping Chen, Udaya Vempati, and Vamsi Rompicharla. Tao Qu is expected to defend his Ph.D. thesis work in late winter quarter.



Outreach:

- Max Glover (standing on the left) and Nick Scheufler (next to Max) are two undergraduate seniors with EE major. Here they are observing a Temperature-Modulated Differential Scanning Calorimeter scan being set up by three graduate students; Fei Wang (sitting) , Ping Chen (standing extreme right) and Udaya Vempati (next to Ping). Max spent summer of 2003 at Intel as part of a co-op job. Max is of Latin American descent. He plans to set up a system to record current- voltage characteristics of glasses to measure threshold Electric Fields for Ovonic Switching.